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ABSTRACT

Strategy for developing and implementing an environmental education program in grades K-12 is proposed in this booklet. Its goal is to help students become environmentally educated decision-makers; to understand the importance of relating ecological, economic, social, technological, and political information when working toward the solution of environmental problems. Nine steps in the sequential strategy are outlined and elaborated upon. These cover establishing an environmental education advisory committee, obtaining funds, hiring and formalizing responsibilities of a coordinator, defining program goals, setting up operational objectives, determining strategy for curriculum development and implementation, providing an inservice teacher education program, assisting schools in developing their school sites, and constructing measurement instruments to evaluate effectiveness of the program. Since the strategy is designed to be integrated into the existing curriculum, the environmental encounter and school site development approach are emphasized. Two encounters are exemplified as well as numerous goals and sub-goals for developing appropriate attitudes and skills. This is to encourage the student to be knowledgeable concerning the bio-physical environment and associated problems, aware of how and skilled in helping to solve these problems, and motivated to work toward their solution. (BL)

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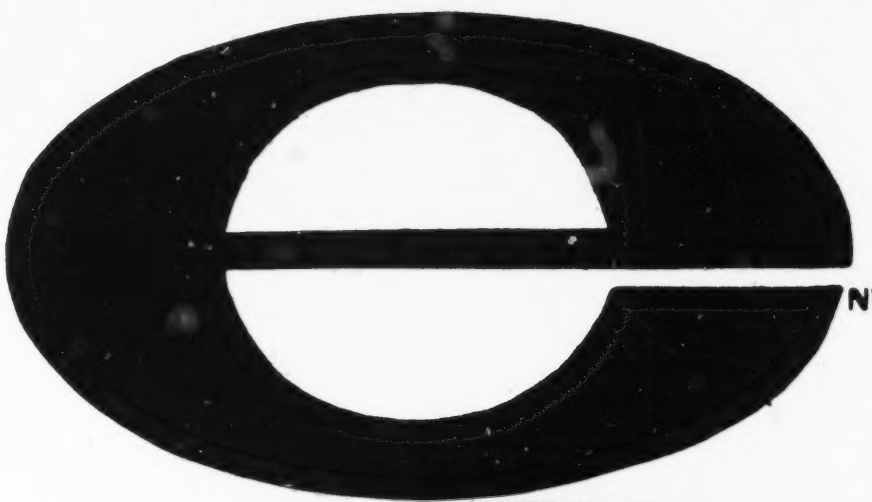

ENVIRONMENTAL

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DEVELOPING AN ENVIRONMENTAL EDUCATION PROGRAM K-12

BY

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AN ENVIRONMENTAL EDUCATION PROGRAM, (K-12)

by Dr. William B. Stapp and Ellen Vande Visse

Introduction

We live in a closed life-support system. We have on our spaceship earth all of the air, water and land we will ever have. Space and resources are limited, yet since 1950 we have added one billion people to an earth confronted with unprecedented environmental problems. United States comprises only six percent of the world population yet we consume over 50 percent of the world's natural resources.

As we enter the 1970's, we must realize that open land is being reduced. Large and middle-sized communities, many within complex urban regions, have evolved to where people are concentrated on a small portion of our land surface. (Over 70 percent of this country's population resides on 1½ percent of our land surface.) With every passing day, over five square miles of our nation's land surface is becoming urbanized. By 1985, 65 million more people will reside in urban areas than in 1960. Within this same period of time, 41 million of our 53 million youth between the ages of 5 - 17 will be living in an urban setting (Freeman, 1968). It is estimated that by 1980, eight out of every ten Americans will probably live in an urban environment. Consequently, the independent rural-oriented living that once characterized our heritage is no longer a dominating influence on the lives of the great majority of our people.

Our urban areas are being plagued with complex biological-physical-social problems, such as the lack of comprehensive environmental planning, community blight, air and water pollution, traffic congestion and lack of institutional arrangements needed to cope effectively with such problems. Add to this the specter of even more people crowded into already highly dense urban areas as population growth continues. Man has but a short time to become trustee of his inherited land, air and water and to live in harmony with his environment. On how well and how soon he learns this lesson rests the fate of our existence on planet earth.

Root Causes Vs. Symptoms

To help resolve environmental problems that threaten the very existence of human life, our society needs to attack the problem at the "root level." In the past, we have primarily focused our national effort at the "Symptom level."

It is apparent that we will be facing the environmental problems of today in the future, and breeding new ones, until we identify the causes of our environmental crisis and develop action programs to resolve them.

It is evident that some important root causes of our environmental crisis rest in our present consumer and corporate behavioral patterns, our

inability to cope with the population dilemma, and the lack of environmental policies that are responsive to an emerging ethic where man is living compatibly with his environment.

It is vitally important that citizens question the concept of consumerism as reflected in the present life style of Americans. It is easy to get caught up in a cycle created by corporations. For some businesses to be successful and continue they need to force the consumer into a life style that is in conflict with man living harmoniously with his environment. Persons once needed products, but now the products need people to survive (Johnson, 1969). Citizens of all ages need to examine their way of life to determine the degree to which it reflects a commitment to both protect and enhance the environment. As an example, citizens should be active in solving traffic congestion both through the political process and by walking, bicycling, or using rapid transit rather than their cars. If the car must be used, driving pools should be formed. How much are we willing to personally sacrifice in order to provide a high quality environment?

Corporations and other non-governmental organizations must be more sensitive to the environment if we are to move toward a higher quality way of life. Both the private and public sectors need to spend more money to curb pollution. Furthermore, corporations and businesses must review their advertising policies in keeping with environmental concerns and maximize environmental safeguards.

Government, at all levels, must also become more responsible and responsive. Environmental responsibility is slim when the national defense budget takes 36 percent of all tax dollars. Yet allocation to education is only one percent, to housing and community development is one percent, and to agriculture is two percent in the national budget. Pollution abatement policy is weak, tangled in red tape or lacking altogether.

More responsible action toward the environment by citizens, corporations, businesses, and government is imperative. For in the last analysis, it is not possible for man to live harmoniously in a closed system without creating a "human community" that lives in a lasting balance with natural laws.

The responsibility of businesses, corporations and governments toward the environment rests within each of these bodies. It also rests with the citizen. As consumers, stockholders, voters, and advocates, citizens can help to establish sound environmental policy in various ways. Specifically, they can ask informed questions, at the proper time, of the right people. They can boycott a product and campaign for others to do likewise. They can serve on advisory and policy-making committees. They can support and be advocates for sound legislation directed at resolving environmental problems. Citizens can make decisions as they <u>cast</u> votes on environmental issues; as they <u>elect</u> representatives to policy-making bodies; as they directly <u>act</u> upon the environment itself.

The foundation for strong citizen action rests, to a large degree, on what happens in our homes and schools. Today's youth will soon be the citizens and voters whose decisions will affect not only the immediate environment in which they live, but also that of our nation. They will make the choices and cast the votes about recreation, transportation, beautification, water needs, and control of air and water pollution.

It is of critical importance to obtain better insight into approaches school systems might consider in assisting youth to become more sensitized to the environment and more inclined to participate in coping with environmental problems.

An appropriate role for school systems to assume in environmental education is to provide the opportunity for youth to explore their environment, both physically and intellectually, in order to obtain both the motivating concern and the factual knowledge regarding man's relation and responsibility to his environment. Schools have a responsibility to alert youth to emerging environmental problems and appropriate ways for citizens to act in helping to resolve these problems.

More specifically, if an important "root cause" of our environmental crisis is the life style of our people, then schools should be concerned with the development of values, beliefs, and attitudes that are compatible with man living harmoniously with his environment. Furthermore, skills need to be developed to enable students to play an effective role in achieving goals derived from his attitudes.

Citizens that have these values, attitudes and skills (which will be specified under goals section) should be more responsive and responsible in their personal behavioral patterns and more effective in changing corporate and governmental action so that it reflects an increased commitment toward a quality environment.

Major Obstacles to Environmental Education

It is important to recognize that the goals of environmental education are quite compatible with many of the recent curriculum reforms in traditional areas of study. Therefore, environmental educators should work cooperatively with curriculum innovators in all fields of study to help attain compatible goals. Many of the obstacles that confront environmental education are not unique--they are inherent to the American educational system. We must identify these obstacles and team with other educators to resolve a common problem. At least four major obstacles need to be recognized and remedies recommended.

1. As the learner proceeds from kindergarten through the twelfth grade, educational material is increasingly organized around discipline and little emphasis is placed on problem-solving. This presents an obstacle because environmental education advocates an interdisciplinary, problem-solving approach to interdisciplinary problems. The problem-solving approach may need to be a more intergral part of collegiate education before it can be successful at the elementary and secondary level. However, the problem-solving approach has been generally accepted by curriculum coordinators and school administrators and it will be a matter of time before it becomes more widely used at the elementary and secondary level.

2. The curriculum is already crowded with subject matter material and it is difficult to persuade administrators to incorporate additional information into an already crowded school day. A rationale that has been used to counter this point, is that environmental education can serve to link subject matter fields and reinforce the existing curriculum. Environmental education also provides relevance for existing curricular material.

3. As has been noted earlier, environemntal education cannot avoid value questions and public schools have generally stayed clear of value discussions, particularly those that might run counter to community norms and attitudes. It is generally espoused that teachers should not inculcate into the minds of students their own values which run counter to those normally accepted by the larger society within which they live. Environmental education has been most successful when teachers have examined value questions from different points of view and with total class participation.

4. There is a severe shortage of classroom teachers prepared to effectively integrate environmental education into instructional programs. The traditional approach to the teaching of environemntal matters has been for the teacher to become knowledgeable about some aspect of the environment, and then to transfer this knowledge to the student through the lecture method. This process has not been successful in stimulating interest in environmental matters or helping the student to acquire values, beliefs, attitudes, or skills conducive to the development of an environmentally literate citizenry. Several leading environmental educators (Brandwein, 1971; Swan, 1970; Stapp, 1970) have advocated an approach where the teacher encourages class members to investigate their community environment in an effort to reinforce classroom material and to provide a working knowledge of the human eco-system. This represents a departure from a "read and discuss" procedure, to a process where class members view the environment firsthand, attend public hearings, gather relevant information, consider alternative solutions to problems identified, and advocate solutions through appropriate channels. This means that the prime role of the teacher is not to lecture on the environment, but rather to assist class members in acquiring information relevant to their environmental concerns.

Schools, then occupy a uniquely strategic position in producing environmentally literate citizens. The obstacles listed are considered and dealt with in the strategy mapped out below for the development of an environmental education curriculum.

STRATEGY FOR DEVELOPING AND IMPLEMENTING AN ENVIRONMENTAL EDUCATION PROGRAM K-12

The following is a sequential strategy that seems most appropriate to date, given the considerations of situation and obstacles.

I. Establish an Environmental Education Advisory Committee

II. Obtain funds and hire an Environmnetal Education Coordinator

III. Formalize the responsibilities of the Advisory Committee and the Coordinator

IV. Establish the goals and sub-goals of the Environmental Education Program

V. Establish the operational objectives of the Environmental Education Program

VI. Establish strategy for curriculum development and implementation

VII. Establish inservice teacher education programs

VIII. Assist schools in developing their school sites

IX. Develop instruments to evaluate the effectiveness of the program

I. Establish an Environmental Education Advisory Committee

An essential component of most school programs is effective communication between the community and school system. The introduction of an environmental education program will require the involvement and preparation of administrators, teacher staff, students, and the community.

A major responsibility of an environmental education committee is to facilitate communications and provide guidance to the program. The committee should be composed of administrators, teachers representing various grade levels and subject areas, students, and citizens.

II. Obtain funds and hire an Environmental Education Coordinator

An example of funding for an environmental education program is found in the Kent Intermediate School District: In the spring of 1971, the combined Environmental Education Committee was awarded a grant for $7,500 for one year from the Grand Rapids Foundation on the condition that a matching sum be raised by the community. The total is to fund the salary of a coordinator and the expenses of a one year pilot environmental education program in the Kent Intermediate School District. On July 15, this combined Environmental Education Committee hired an Environmental Education Coordinator (Ellen Vande Visse) to provide leadership in the development of this program. Contributions to complete the fund-matching have been received from the National Sanitation Foundation through the Grand Rapids Environmental Quality Demonstration Project, Kent Intermediate District, and local businesses, industries, and organizations.

After funding such as this is completed for one experimental year, it is hoped that the program and coordinator position will be incorporated and funded by the school district.

III. Formalize the responsibilities of the Advisory Committee

The major responsibility of the Committee is to serve in an advisory capacity to the Coordinator. It will be responsible for:

1) *Generating new ideas, projects, and directions for the program;*
2) *Helping the Coordinator in steering the direction and administration of the program;*
3) *Acting as a sounding board for policy, direction, and involvements;*
4) *Facilitating communication among schools, citizens, groups;*
5) *Helping direct and coordinate the community education aspects in conjunction with the academic facets of the program;*
6) *Raising money to finance the program;*
7) *Evaluating and critiquing the program.*

The major responsibilities of the Environmental Education Coordinator are:

1) *Administer the program;*
2) *Guide the development of the philosophy and structure of the program;*
3) *Become familiar with existing instructional material relevant to environmental education;*

4) Develop curricula K-12;
5) Identify community resources, both physical and human, to serve the program
6) Assist in the development and distribution of instructional material
7) Train community citizens to serve the program;
8) Make presentations to parent-teacher and other community organizations regarding the program;
9) Help design and lead environmental field trips and be available to assist in classroom teaching of environmental topics;
10) Assist in the development of school sites to serve the program;
11) Offer in-service teacher education programs through workshops, extension courses, and the like;
12) Assist in the expansion of the school district's environmental education resources and instructional aids;
13) Maintain liason between the school district's instructional programs and environmental organizations to provide coordination among the various efforts towards solving environmental problems.

IV. Establish the Goals and Sub-Goals of the Program

Without a clear statement of goals, an environmental education program would become a series of unrelated experiences, focusing on limited program objectives. A recommended goal for an environmental education program is to assist participants in becoming knowledgeable concerning the biophysical environment and associated problems, aware of how and skilled in solving these problems, and motivated to work toward their solution, (Stapp, et. al., 1969).

The major sub-goals (Stapp, et. al., 1969) of the environmental education program are:

1. Cognitive - To assist the participants in acquiring a basic understanding of the following concepts that support and undergird the philosophy of spaceship earth:

   a) Closed System: We live in closed life-support system (except for solar energy). We have on our space ship earth all the air, water and land we will ever have--space and resources are limited.

   b) Ecosystem: Living organisms and their non-living environment are inseparable interrelated and interact upon each other. The exchange of material between the living and non-living parts follow circular paths. The relationships are complex and extremely vulnerable to sudden disturbances.

   c) Human Ecosystem: Man must have a clear understanding that he is an inseparable part of a system, consisting of man, culture, and the biophysical environment, and that man has the ability to alter the interrelationships of this system.

   d) Land Ethic: Man must develop an ecological conscience toward the environment which reflects a commitment of individual and

group responsibility to future generations. He must develop an ehtic where man is not a conqueror of the land-community but a citizen of it. Only when each person and community acts in a responsible, ecologically-conscious manner will we be able to live in harmony with, and within, our environment.

e) *Population:* *Our earth is threatened and challenged by our rapidly increasing human population. The most common form of overpopulation involves not too many people for available space, but too many people for available resources, or too many people for the proper functioning of society.*

f) *Environmental Contamination:* *Increasing human population, rising levels of consumption, and the resultant demands for greater industrial and agricultural productivity inevitably result in increasing environmental contamination. Man must add the concept of recycling for our spaceship system, for the residuals of production not only pollute the system, but contribute to the depletion of valuable resources.*

g) *Environmental Quality:* *Man must develop attitudes of concern for the quality of the environment, in terms of both physical and psychological effects, which will motivate him to participate in environmental problem-solving (such as environmental planning)*

h) *Environmental Decisions:* *If man is to live harmoniously with his fragile environment, he must rethink consumer and corporate behavioral patterns as wellas governmental policies. New behavioral patterns and policies need to reflect an emerging ethic where man is a steward of his environment. The environmental decisions in each of these three areas would represent collective interests and should be based on long-term environmental benefits.*

2. *Affective - To assist the participants in developing a concern for the quality of the environment and a motivation to help resolve environmental problems.*

   Some important affective components that the program should assist the participants in developing are:

   a) *Interested in his environment and its relationship to society.*

   b) *Sensitive (total awareness) to his environment, both*

natural and man-made aspects of it.

c) Sensitive to the dimension of quality of his environment and able to recognize environmental problems.

d) Inclined to participate in coping with environmental problems.

3. Skill-Behavior - To assist the participants in developing critical thinking and action skills necessary for them to help prevent and solve environmental problems.

Specifically, the program is designed to assist the participant in acquiring these important skills:

a) One important skill is to think critically, ie., to

1) Identify critical issues
2) Recognize underlying assumptions
3) Evaluate evidence or authority:

-Recognize bias and emotional factors
-Recognize stereotypes and cliches
-Distinguish between verifiable and unverifiable data
-Distinguish between the essential and incidental
-Distinguish between the relevant and non-relevant
-Determine whether facts support a generalization

4) Draw a warranted conclusion (From the American Council on Education, Berg, 1965).

b) A second important skill is that of problem-solving. Problem-solving procedure consists of the following phases:

1) Defining the environmental problem or issue
2) Becoming informed about the problem
3) Stating the alternative solutions
4) Developing a plan of action based on a chosen alternative(s)
5) Implementing the plan of action

c) A third important skill is learning the art of valuing (see Harmin, et al.). Decision making is always a matter of weighing alternatives and consequences, and this requires practice in recognizing the values behind the choices made. Being able to choose among options and their ultimate effects involves development and assertion of personal, not teacher-inculcated, values.

d) A fourth important skill for citizens to possess in solving environmental problems is the development of change strategy. Once the citizen has defined the issue collected and evaluated relevant information and weighed alternatives, he should have political insight for instituting the solution he has chosen as best.

Implicit in these goals and sub-goals are two corollary goals for students. One is the building of positive self-images so that individuals feel they <u>can</u> accomplish change. Another is recognizing and learning to deal in the complexities of modern life: there are no simple answers for the tangle of ecological interdependencies of biophysical and social systems. These are best fostered in a classroom atmosphere where the teacher encourages a free exchange of ideas and feelings. With this teaching model the

teacher learns with students and they explore together, as opposed to students memorizing pre-digested content of a lecture.

V. Establish the Operational Objectives of the Environmental Education Program

During the school calendar year it seems appropriate that the following might be accomplished:

1. The establishment of an expanded and formalized Environmental Education Advisory Committee;
2. The selection of at least three pilot schools (one elementary, one junior high, and one high school) within the school district in which to develop and integrate environmental education program;
3. Within each pilot school
   - -the presentation of the general concepts, and curriculum strategy goals of environmental education;
   - -the establishment of a school site development committee which has mapped an overall and long-range plan, raised funds, and begun to implement the plan;
   - -the offering of in-service teacher education workshops;
   - -the establishment of one teacher who serves to coordinate the program at that school and acts as a building representative in the planning and administration of the total program;
   - -the experimentation on the part of pilot classrooms in each school with at least one environmental encounter.
4. The training of citizens to assist in the program;
5. The offering of a comprehensive in-service teacher education program through workshops and extension courses, to cover the areas of environmental inventory, encounter writing, and school site development;
6. The establishment of a full or part-time environmental education consultant paid by the school system to continue the development of the program;
7. The development of bibliographies, films, lists and other instructional materials, resource speaker lists, written materials, and field trip opportunities for school use in environmental education;
8. The encouragement and facilitation of coordinating educational efforts among the local and state environmental-interest organizations;
9. The development of instruments to evaluate the program's effects and effectiveness, both for individual classes and for the program's direction and goals as a whole.

VI. Establish the Strategy for Curriculum Development and Implementation

A. Review of literature

A recent review of the literature regarding theories of learning and instruction reveals the following points that should be considered in the formulation of any environmental education program.

...Behaviors which are reinforced are most likely to recur. It is important that desired behaviors be reinforced by the home, school, church, youth organizations, etc.

...The most effective effort is put forth by youth when they try tasks

which fall in the "range of challenge"--not too easy and not too hard--where success seems likely but not certain.

...Youth are more likely to throw themselves wholeheartedly into any project if they themselves have a meaningful role in the selection and planning of the enterprise.

...Reaction to excessive direction of the teacher is likely to be: apathetic conformity; defiance; escape from the whole affair.

...What is learned is most likely to be available for use if it is learned in a situation much like that in which it is to be used and immediately preceding the time when it is needed. Learning in youth then forgetting, and then relearning when need arises is not an efficient procedure.

...The learning process in school should involve dynamic methods of inquiry.

...Learning takes place through the active behavior of the student. It is what he does that he learns, not what the teacher does. The essential means of an education are the experiences provided, not the things to which the student is merely exposed.

...One of the keys to motivation is a sense of excitement about discovering for one's self, rather than having a generalization presented by a teacher and requiring a student to prove it.

...Attitudes may not be formed through a rational process by which facts are gathered and a reasonable conclusion drawn, but rather through the repeated exposure to ideas.

...Helping citizens to acquire technical knowledge alone regarding an environmental problem, may not increase their concern for the problem.

...Citizens are more likely to become involved in environmental issues if they are aware of how they can have some effect upon decision-making.

B. Curriculum organization

An important criticism of our public school systems is the lack of adequate articulation between the various divisions of the school organization. Instead of well-developed series of instructional units and activities commencing at the kindergarten levels and terminating at the twelfth grade, many school systems present a series of units that have little relationship between what has previously been taught and what will be taught in future years. An environmental education program, then, should span the curriculum K-12, so that environmental experiences can be presented at every grade level thereby capitalizing on the cumulative effects of the program. The umbrella concept of "spaceship earth" could facilitate this span.

It is also important to plan an interrelated curriculum horizontally as well as vertically. Disciplines, such as science and social studies, should not be studied in isolation. An environmental education program should link subject areas that relate most closely to the environment, so that both the social and scientific knowledge important in understanding and solving environmental problems are properly developed. For example, "water pollution" is interwined with economics, governmental policy, biology, and attitudes, and demands interdisciplinary investigation.

A curriculum program should also recognize individual differences. There is no sequence that will meet the needs of all groups of youth. Therefore, a curriculum program should be flexible in design so that material can be

presented in different ways depending on the background, needs, and aspirations of the students.

The curriculum should integrate and correlate the program with the existing curriculum in a manner that will enhance the instructional goals of the school system. To add a course or a new subject area just about the environment into an already tightly packed school day would be unrealistic and limiting.

The focus of the environmental education program should be on the local environment, though not neglecting regional, national, and international environmental issues. It should stress attitudes, valuing, and problem solving skills. These students will be the urban voters who will make an important impact on their environment by their actions.

The learner should play an active role in the learning process. The curriculum should be structured so that the learner can develop attitudes through experiences and personal thinking, not through the presentation of pre-digested conclusions.

And finally, the curriculum design should provide for comprehensive in-service teacher education programs which would be continually available to assist teachers in being effective with this curriculum.

C. A Curriculum methodology: Environmental Encounters

It is extremely important to establish the specific curriculum program only after the goals, objectives, and basic organization alternatives have been thought through. Without a clear statement of these, the program would become a series of unrelated experiences with no clear purpose.

1. Definition of Environmental Encounters

Environmental encounters are designed as an approach for teaching about environmental issues, and best seem to fulfill all the specified needs of an environmental education curriculum program. They are based upon current knowledge of human behavior and upon the goals and objectives outlined for this program. This approach can be adapted to any classroom, elementary or secondary, but is not an additional course or new subject area.

Briefly, an environmental encounter within any class means that students themselves identify the problem they find most critical to them at the time. It may be a lack of places to ride their bicycles, or complaints of overpriced food at an inner-city grocery store, or concerns over a condominium development. Then the students do not just listen to a lecture on the problem. They seek out the facts in the community, and then weigh alternative solutions. And the alternative they find the best, they support with action. Thus the encounter encompasses real-life problems. It helps the student learn the skills to improve his environment. It teaches him how to be an effective citizen by real experience. The investigation requires a multi-disciplinary study if all sides of the problem are to be understood. This well-rounded approach can occur in an English class just as well as in a biology or history classroom.

It should be made clear, however, that some of the areas to be studied need not be problem-oriented. This is particularly true at the lower grade levels where there should be an attempt to bring out basic awarenesses and appreciation for the environment. An example might be the investigation of the school site by a first grade class to expose the children to certain basic ecological principles. The recognition and solving of relevant problems is appropriate for the early grades,

however. But the "honing" of problem-solving skills is more appropriate for the later grades.

Environmental encounters force the student to come to grips with many of the variables affecting environmental matters. For example, when procuring data and selecting alternatives, the student must deal with the political process, economic forces, and the state of our technology. The student is judged on how well he can deal with situations which are real rather than simulations of reality (Willink, 1970).

2. Writing encounters.

Each encounter should contain a list of the outcomes that are desired. The outcomes should be expressed behavioral objectives. They (behavioral objectives) provide direction for the learning process; greater focus on the learner--what the learner does, and the opportunity to appraise (evaluate) the effectiveness of a particular learning experience. Behavioral objectives can be stated in the three domains (cognitive, affective, and action) of educational objectives.

In writing behavioral objectives, it is important that the following criteria be met: 1) identify the terminal behavior; 2) describe the situation in which the behavior is to be observed; and 3) establish the extent to which the student should exhibit the behavior (Montague and Butts, 1968).

A school system desiring to develop an environmental education program based on environmental encounters might desire to have at its disposal a series of model encounters relating to all grade levels and disciplines. The number need not be large (Utica Public School System, 1970), however, it is recommended that students play a major role in both selecting and modifying existing encounters and developing new ones.

An example of an environmental encounter recommended for a 6th grade class is as follows:

INVESTIGATING A POND COMMUNITY

"An Environmental Encounter for a Sixth Grade Class"

Behavioral Objectives:

In the completion of a successful encounter, the student should be able to :

1. Draw an accurate map of the drainage area of the pond community.
2. Describe in writing four ways that the land in the drainage areas affects the pond community.
3. Draw two (2) food chains illustrating organisms observed in the pond community.
4. List (number) major problems affecting the pond community.
5. Describe in writing the major steps in solving one (1) of the problems noted in question 4.

Activity:

1. What is the bottom of the pond community like: How does the type of bottom affect the kinds of plants and animals found in the pond community?
2. As you look from the center of the pond community toward the shore, are there plants growing under water, on the surface, and out of

the water? Why are plants important to the pond community?

3. Dip a small jar into the pond and note if there are small organisms (these are probably plankton organisms). Why is plankton important to the pond community? What would cause plankton to increase or decrease?

4. Make or obtain a dip net and sample around the edge of the pond community. How are the animals you have caught important to the pond community? Draw a food chain linking some of the plants and animals you have noted in and around the pond community.

5. On a map of your community color in the land area that drains toward the pond. How has the use of this land changed over the past 15 years? What changes are occurring at the present time? How does the use of this land affect the pond community?

6. Do both children and adults visit the pond community? What do people do when they visit the pond community?

7. Do you see any problems that are affecting the pond community? Who is responsible for creating the problems? What could your class do to help solve one of the problems noted above (define the problem, become informed about the problem, state alternative solutions, develop a plan of action, implement the plan)? Is your class motivated and concerned about one of the problems to the degree that they desire to work toward its solution?

An example of an environmental encounter recommended for a high school American Government class is as follows:

FLOOD PLAIN ZONING

"An Environmental Encounter for an American Government Class"

Behavioral Objectives:

In the completion of a successful encounter, the student would be able to:

1. Draw on a map of his community the flood plains (50 year flood line) of the (name) River from (location) to (location) and record accurately how each flood plain is developed.

2. Describe in writing the number of floods and flood damage that has occurred on the flood plains of the (name) River from (location) to (location) over the past 60 years (or over the time that records have been filed).

3. Describe in writing the major provisions in the laws of his state and community regarding flood plain zoning.

4. Identify the power structure (pressure groups, governmental committees, governmental policy makers) of his community regarding who influences and makes policy on flood plain development and zoning.

Activities:

1. Take a tour (or illustrate by slides) along the (name) River from (location) to (location) and note the following:

   a. Are there a series of flood plains?
   b. How are the flood plains developed?
   c. Are there homes or buildings on the flood plain? Are they flood proofed?
   d. Are there provisions for protecting the flood plains from

flooding?

e. What trends regarding land development are occurring on the flood plains of your community?

2. Seek information from reliable sources regarding the flood plains of the (name) River from (location) to (location):

   a. Has flooding of the flood plains occurred during the past 60 years?

   b. List the years in which flooding has occurred.

   c. Approximately how much damage (dollars, lives, inconveniences) have occurred on the flood plains as a result of flooding over the past 60 years?

   d. What does your state flood plain ordinance say? If none exists, is it considering such an ordinance?

   e. What does your community flood plain ordinarce say? If none exists, is it considering such an ordinance?

   f. How is the undeveloped land on the flood plain zoned?

   g. Are there any current proposals to utilize the undeveloped flood plains of your river recreational, residential, commercial, or industrial development?

   h. What proposals seem wise or unwise in light of the hazards you have identified?

3. Draw on a map of your community the flood plains (50 year flood line) of the (name) River from (location) to (location) and record how each flood plain is developed.

4. Determine by interviews the points of view of land developers, community citizens, realtors, chamber of commerce officials, planning commission members, city council members, and students of class regarding the future development of the flood plains of the (name) River from (location) to (location).

5. Based on the information collected, have the class formulate alternative solutions to the development (or preservation) of the flood plains on the (name) River from (location) to (location).

6. Draw a chart of the power structure (pressure groups, governmental committees, governmental policy makers) of your community regarding who influences (underline the influencers) and makes policy (circle the policy makers) on flood plain development and zoning.

7. If the solution advocated by the class members is different from the point of view held by the planning commission and policy makers of your community, then develop and implement a plan of action (presentation to the appropriate authority, develop a fact sheet, publicize your position, etc.).

Each environmental encounter should also provide data regarding sources of additional information relevant to the topic.

The environmental encounters could be placed on "punch cards" and filed in a box, accompanied by a long metal "needle". The box could be placed in the library or office of every school in the system and available for student and teacher usage. The following is an example of a format of an environmental encounter "punch card":

Lower Elem.	Middle Elem.	Upper Elem.	Jr. High	Sr. High

- Ecosystem
- Land Usage
- Population
- Environmental Contamination
- Recycling
- Transportation
- Public Service
- Recreation
- Environmental Design

Investigating River Pollution

Behavioral Objectives - At the completion of a successful encounter, the student should be able to:

1...

2...

3...

Activity:

1...

2...

3...

4...

Sources of Information

1. Film
2. Experimental Kit
3. Overlays
4. Written Material
5. Human Resources, Etc.

An environmental education program based upon the philosophy of "spaceship earth", with environmental encounters providing the means for the learner to understand this important philosophy, should produce an individual who is: 1) sensitive (total awareness) to his environment; 2) able to recognize environmental problems; 3) sophisticated in the utilization of problem-solving skills essential to the solution of emerging environmental problems; 4) and inclined to participate in coping with environmental problems. The learner would also have an understanding and should see the importance of integrating ecological, economic, social, technological, and political information when working toward the solution of environmental problems.

VII. Establish In-service Teacher Education Program.

To assist youth in acquiring a working knowledge of the "spaceship earth" philosophy and the attitudes and skills essential in helping to resolve environmental problems, it is imperative that a comprehensive in-service teacher education program be provided. The extent to which students can be tooled up to be aware, concerned, and active about environmental

problems rests with the extent to which teachers are tooled up to teach.

The goal, then, of in-service teacher education opportunities is to provide teachers with resources, background, and possible methodologies for environmental education. The programs and workshops should involve all teachers at all grade levels and from all subject areas. In-service training should assist teachers in developing and utilizing environmental encounters, and in further integrating environmental education into existing curriculum. It should provide written materials, names of resource people, sample encounters, field trip sites, and instructional aids applicable to the program.

In-service opportunities will be of four main types: Administrator workshops, environmental inventories, environmental encounter writing workshops, and school site development workshops.

In-service teacher education is often affered through several universities found in Michigan. Check with the extension services of these universities to see if they have such service with regard to environmental education.

The other three types of opportunities will be in the form of short in-service workshops within schools. They will be offered upon request to any school or school system, but the pilot schools will receive top priority for workshops. Again, these will be orientations to the basic tenets of environmental education, field trips into the community, development of written materials when possible, assistance in school site development and helps in integrating environmental education into existing curriculum, The Environmental Education Coordinator will serve to generate ideas and provide resources and suggest strategy for the various kinds of workshops conducted by her (him).

Still another opportunity to be explored is that of the Inter-Institutional workshop. This is a new possibility starting this year. The faculty of a school defines their most critical school problem, and explores the causes and solutions with a team of experts from four universities: Central Michigan University, Western Michigan University, University of Michigan, and Michigan State University. Credit will be given to this faculty group who are in turn committed to working towards solutions in their school.

VIII. <u>Assist Schools in Developing their School Sites</u>

Integral to environemntal education curriculum and environmental encounters is the need for places to study and apply those principles. The development of a school site offers such a resource. It means actually designing and creating a richer environment--aestetically, educationally, and recreationally.

Traditionally, school buildings have been expensively equipped, highly educational facilities, while the sites outdoors have been made remarkably unstimulating environments. The grounds have been leveled and drained, and the vegetation removed. When youth are instrumental in the planning and fund-raising and construction of improvements on such a site, either new or already in use, environmental education is maximized. While they are providing new opportunities for curriculum enrichment outside of the classroom, they are building pride and unity into the student body, and learning about community resources and environmental design.

The procedural steps which can facilitate thorough site development are: 1) Form a school site development committee; 2) Consider guidelines for site selection; 3) Inventory the site (or possible future sites); 4) Recommend site to board; 5) Develop land use plan, land development plan, and land maintainence plan; 6) Develop phase-by-phase implementation plan; and 7)

Develop a school and community utilization plan to include curriculum enrichment, in-service teacher training, and community use. Procedures for developing an existing site should include steps 1, 3, 5, 6, 7.

IX. Develop Instruments to Evaluate the Effectiveness of the Program

Evaluative instruments will need to be developed to measure the extent to which behavioral objectives are attained and the effectiveness of the total environmental education program.

Evaluation will be of various types. One necessary kind is the immediate and continual feedback from teachers and students through verbal comments and observations. Another kind is the pre-and post-written test method. These should be objective, reliable, and valid. They could be applied to junior and senior high students, and perhaps to late elementary ones. Behavioral objectives outlines in encounters provide an excellent opportunity to appraise the effectiveness of particular learning experiences. Still another kind could be the story method. When a problem-situation story is told, the evaluator could measure the extent to which students are able to identify key issues, recognize environmental problems and recognize possible alternative solutions based on ecological and social awareness.

In evaluating an environmental education program the following components should be examined: environmental awareness (environmental mapping), cognitive domain, affective domain, skill-behavior, exploratory behavior, self concept, and teacher-student interaction.

SUMMARY

This pamphlet has proposed a strategy for the establishment of an environmental education program, K-12. It can be integrated into the existing curriculum of any school system by means of the environmental encounter and school site development approach.

Its goal is to help students become more environmentally educated decision-makers. The environmentally educated person should be knowledgeable concerning the bio-physical environment and associated problems, aware of how, and skilled in helping, to solve these problems, and motivated to work toward their solution. His education has helped him develop his attitudes and skills to be effective in environmental decision-making. With this program, the twelfth grader may be exposed to all aspects of the environment. However, through the inductive (inquiry) approach advocated by this system, a twelfth grader that had been exposed to this program should be more sensitive to his environment, better able to recognize environmental problems, more sophisticated in the utilization of problem-solving skills essential to the solution of emerging environmental problems, and more inclined to participate in coping with those problems, than the product of other forms of traditional instruction. The learner would also see the importance of relating ecological, economic, social, technological, and political information when working toward the solution of environmental problems.

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